Challenges and progresses in the intercalibration of microwave humidity sounders

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Greenbelt Marriott Hotel
Greenbelt, MD, 20770

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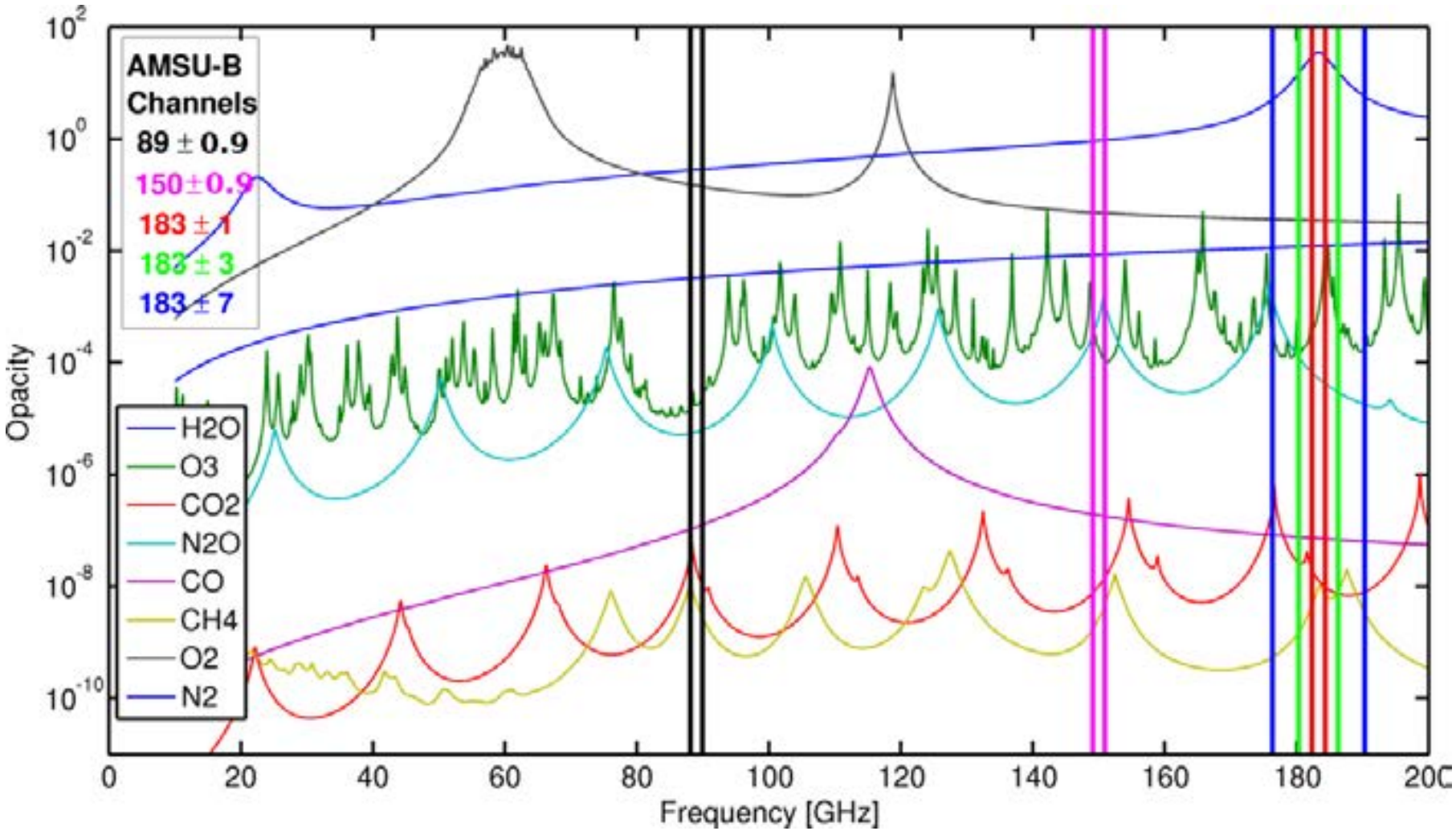
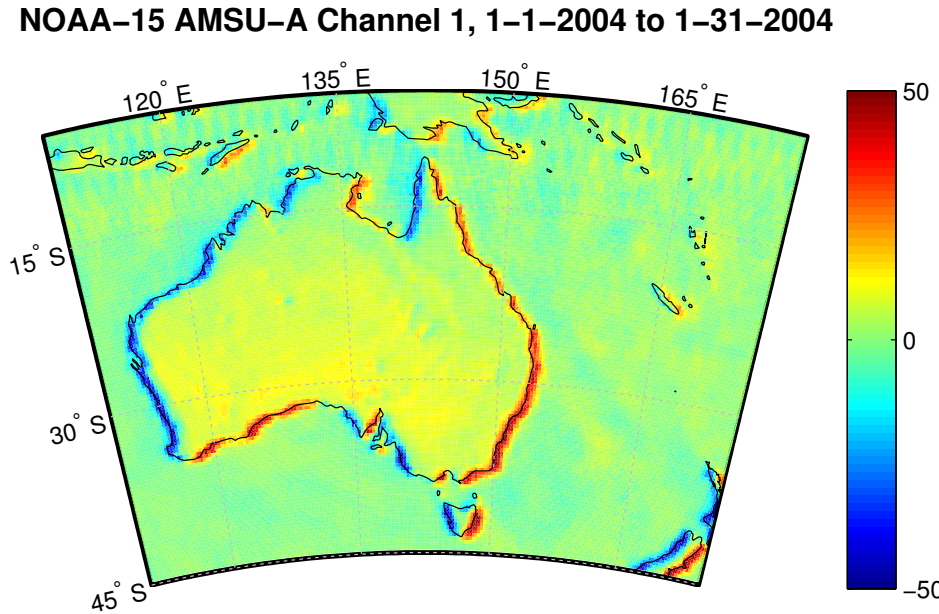
AMSU-B Channels

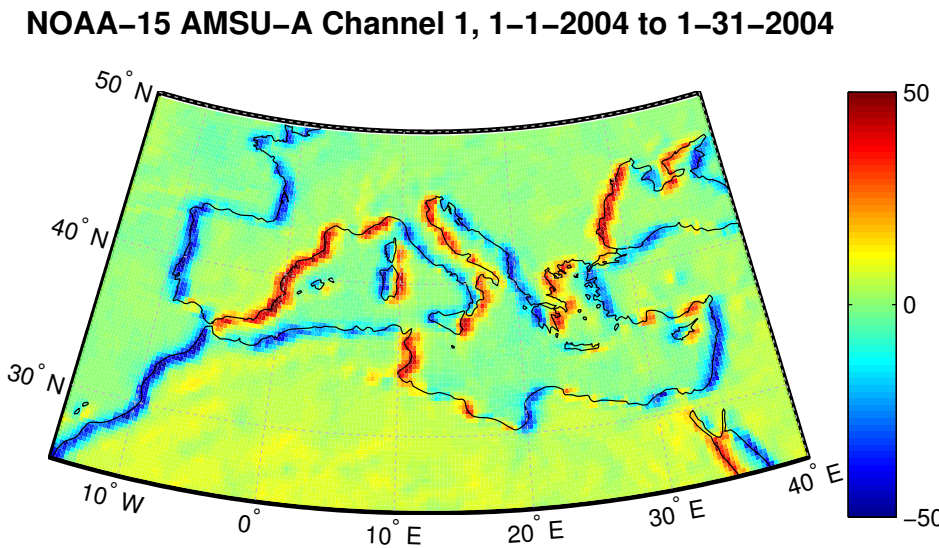


AMSU-B/MHS Level 1b to FCDR

L1b to FCDR Corrections

- RFI correction for AMSU-B attributed to a mismatch of materials (significant for NOAA-15 and NOAA-17)
- Antenna Pattern Correction for both AMSU-B and MHS
- Geolocation correction for all AMSU-A, AMSU-B, and MHS instruments
- Calibration drift (corrected through intercalibration and RT simulations)
- Scan Asymetry (ongoing)





AMSU-B Antenna Pattern Correction

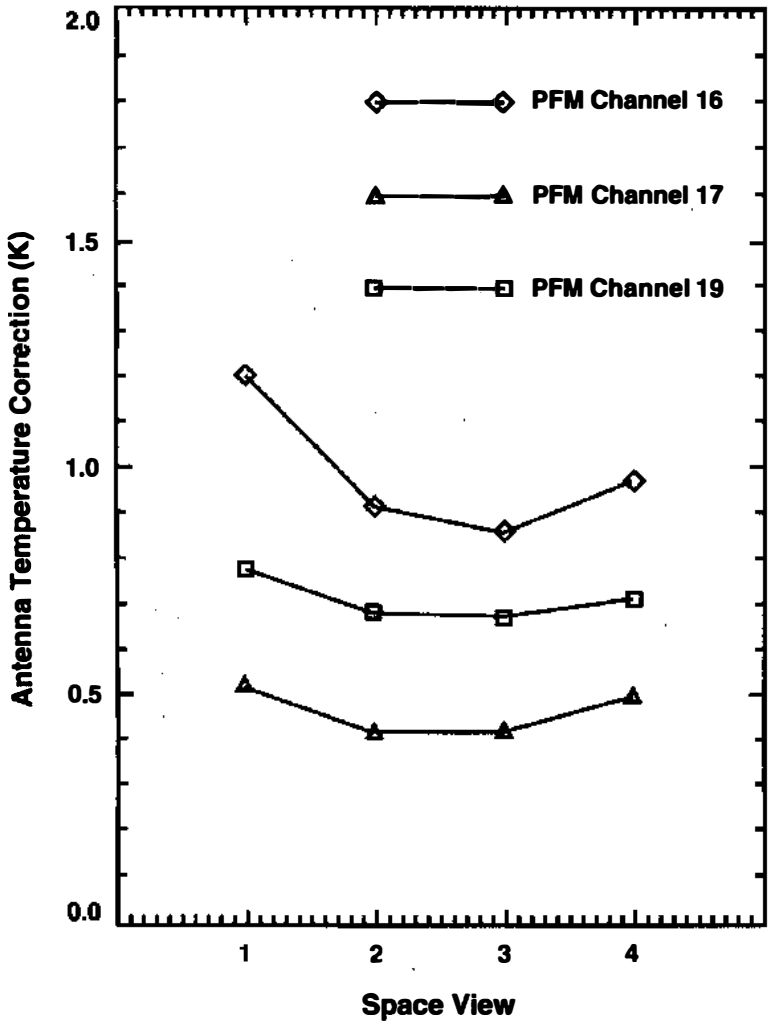


Fig. 6. Predicted antenna temperature corrections for the 4 space views for channel 16 ◇, channel 17 △, and channel 19 □ of the AMSU-B PFM. The correction should be added to the measured brightness temperatures.

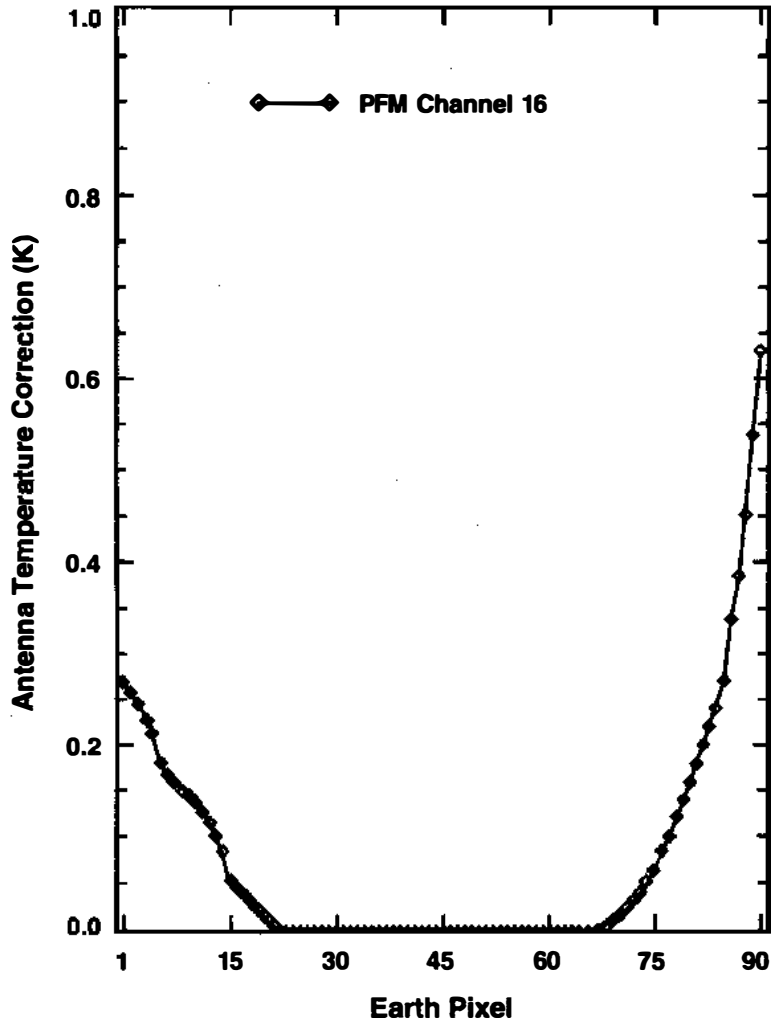


Fig. 7. Predicted antenna temperature corrections for a mean Earth scene brightness temperature of 230 K for channel 16 of the AMSU-B PFM. The correction should be added to the measured brightness temperatures.

Hewison and Saunders, TGRS 1996.

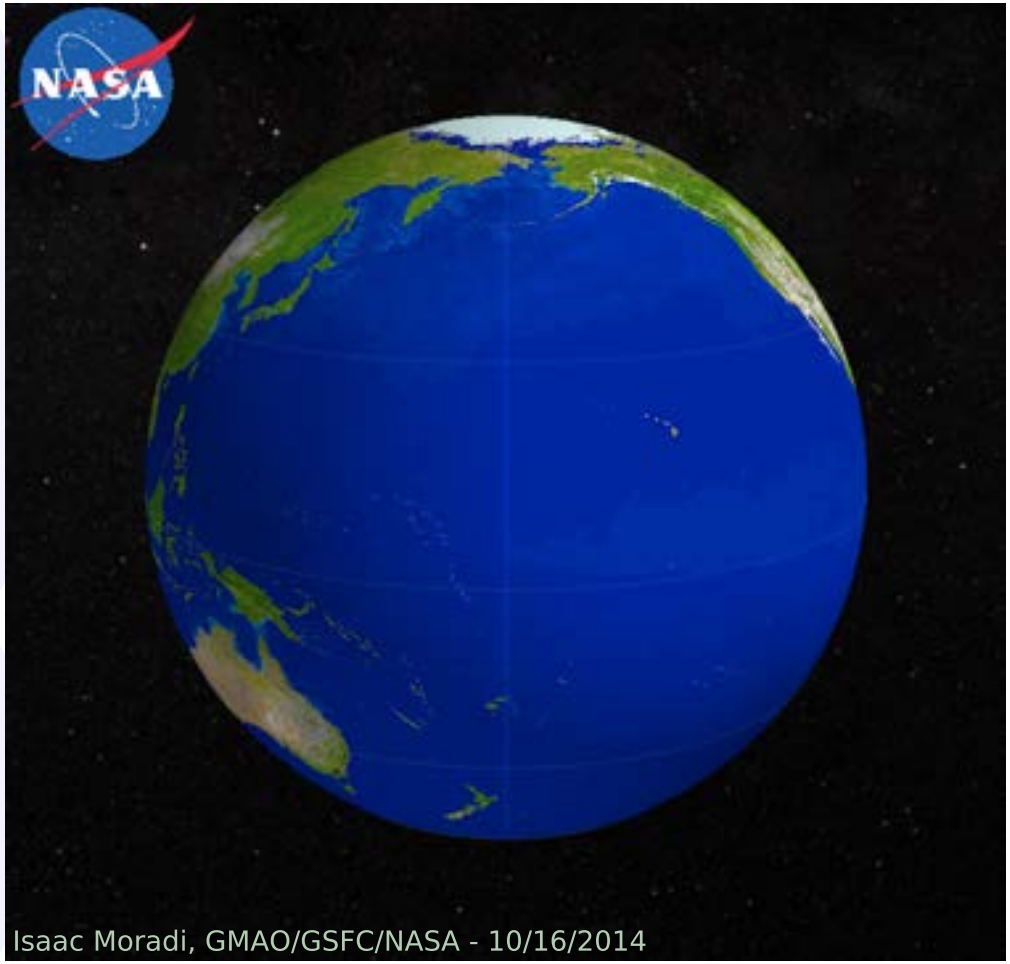
Radiometric Correction

Intercalibration of satellite data

- Simultanous Nadir Observations (SNO)
- Averages over Tropical Oceans
- Polar Averages (only night time)

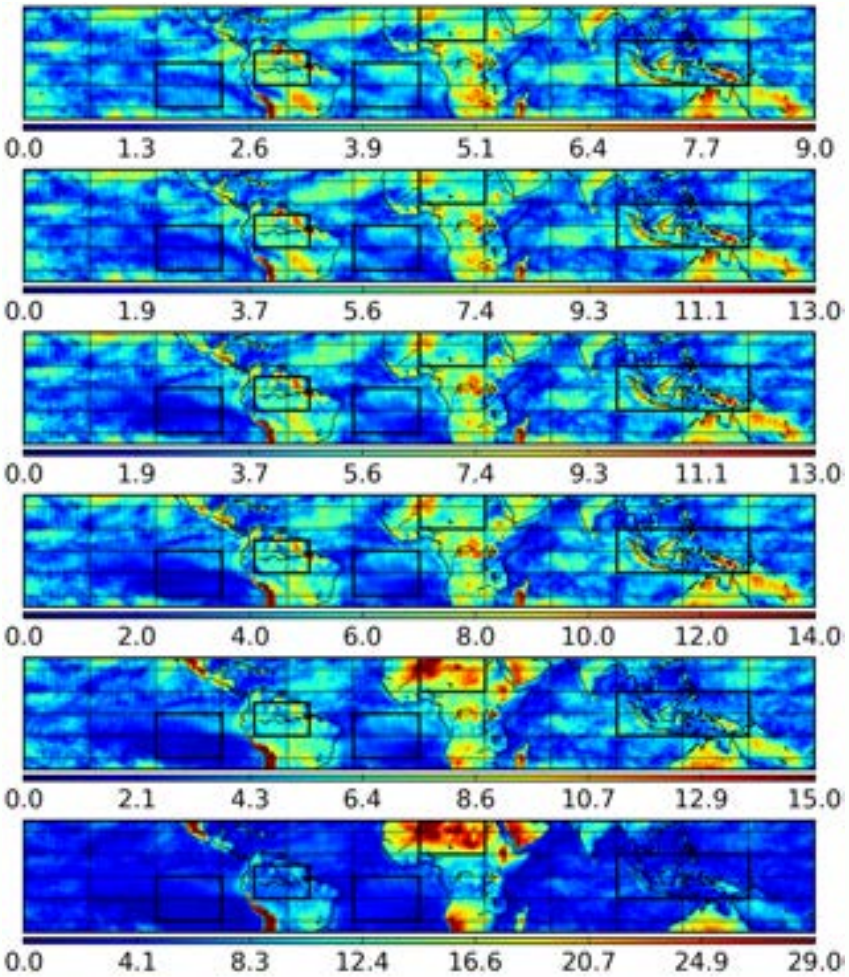
Issues?

- Slight Frequency Differences
- Polariztion Differences

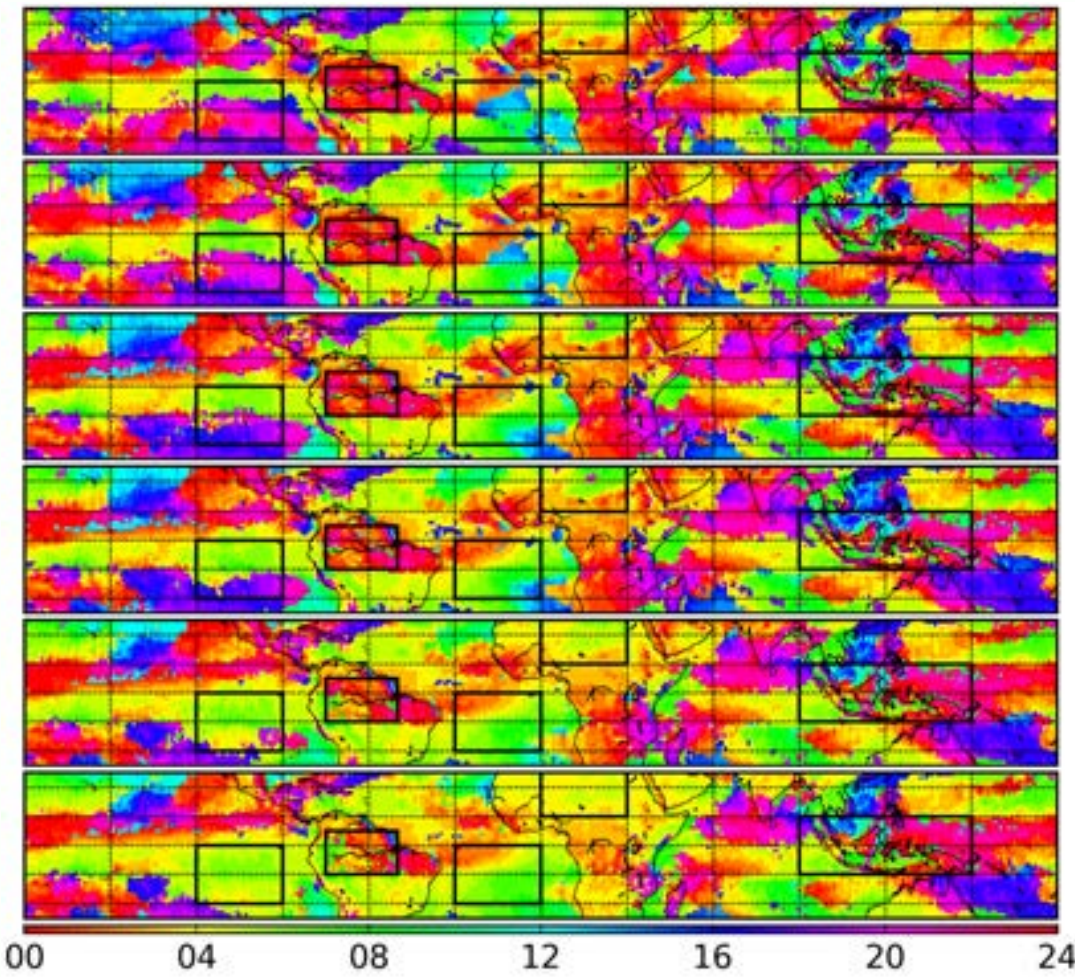


Diurnal Cycle of RH

Diurnal amplitude of RH

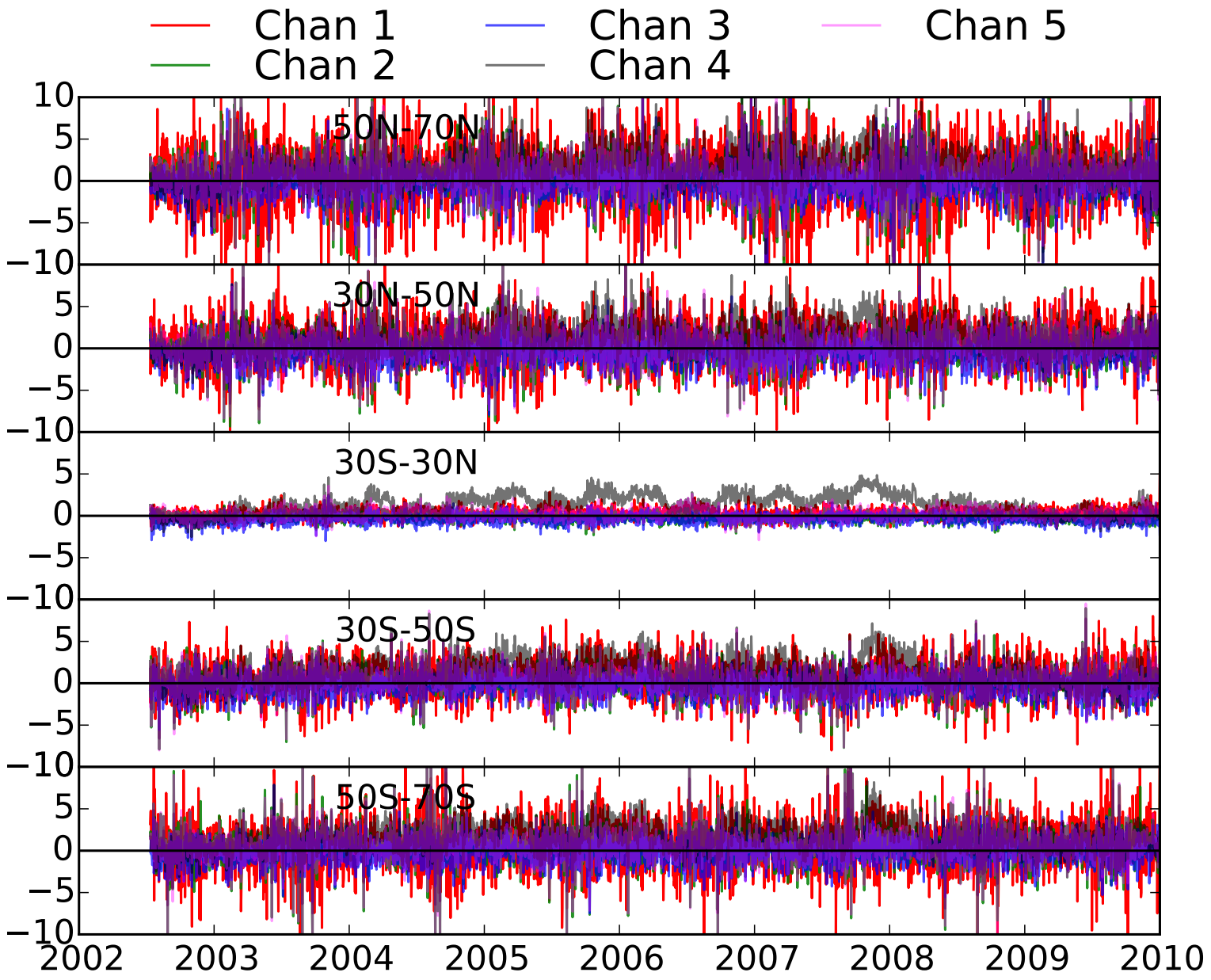


Diurnal peak time of RH

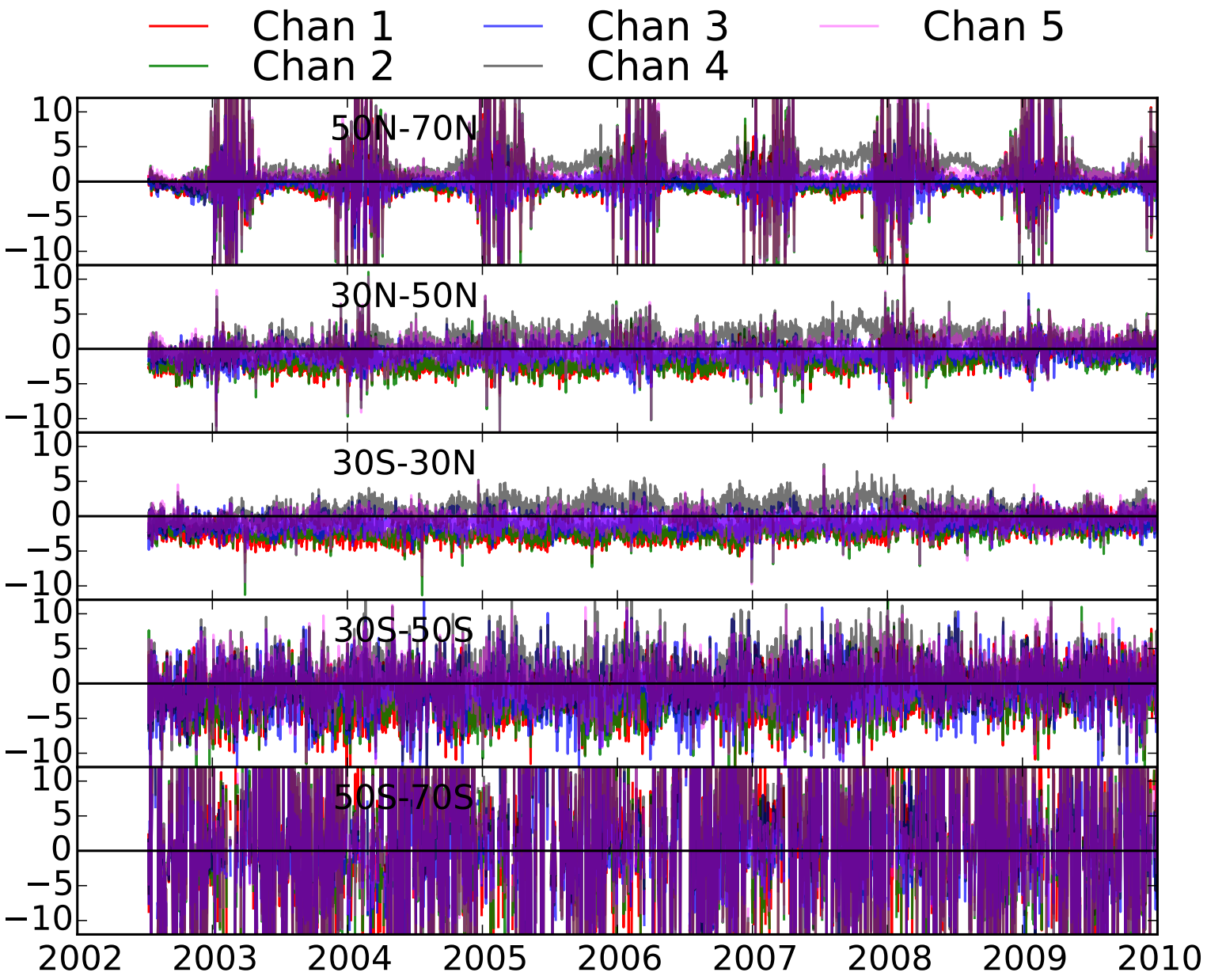


Moradi et al., EGU ACP, 26, 2016.

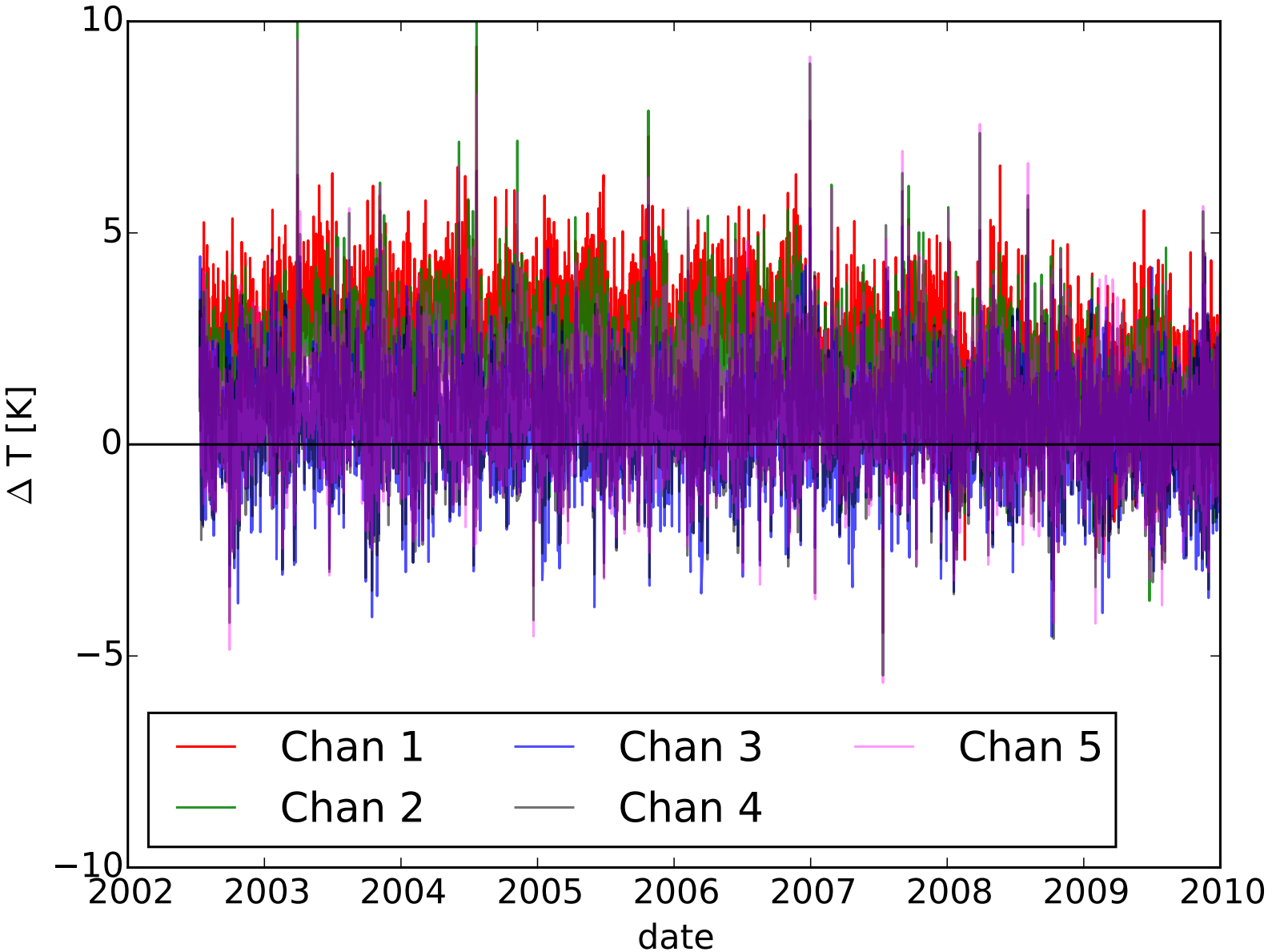
NOAA-15 vs. NOAA-17 over ocean



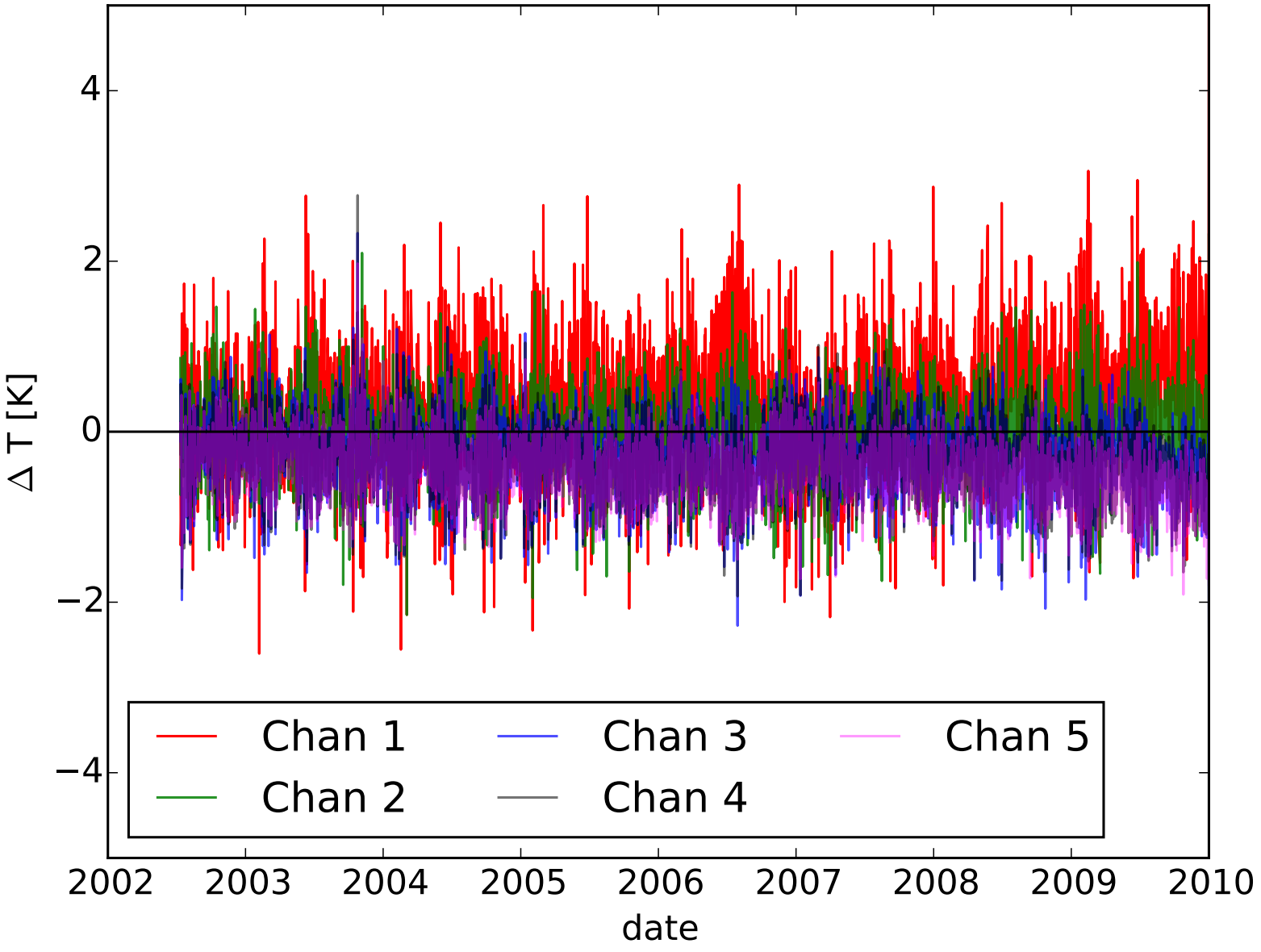
NOAA-15 vs. NOAA-17 over land



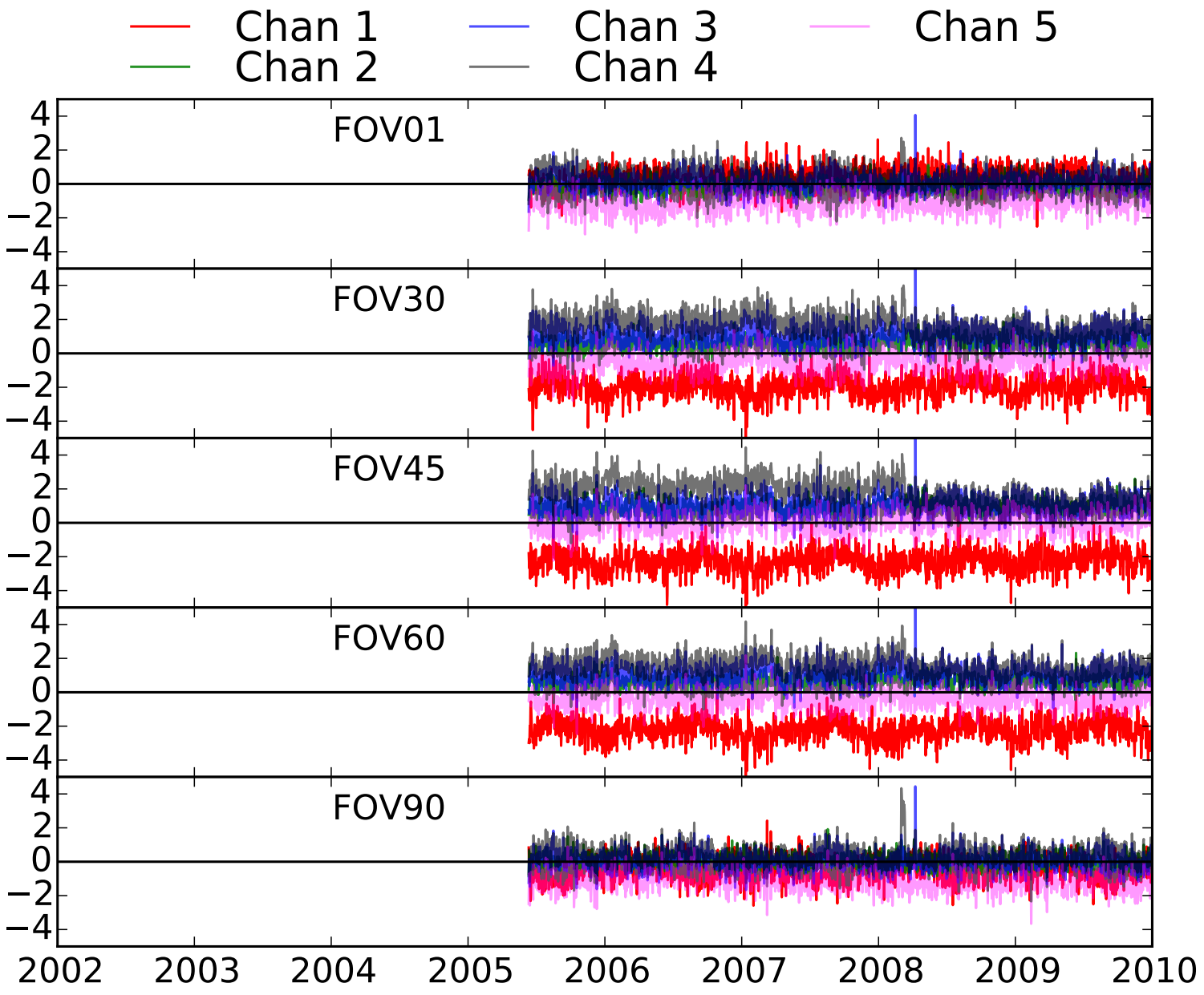
Land/Ocean double differences (N15 - N17)



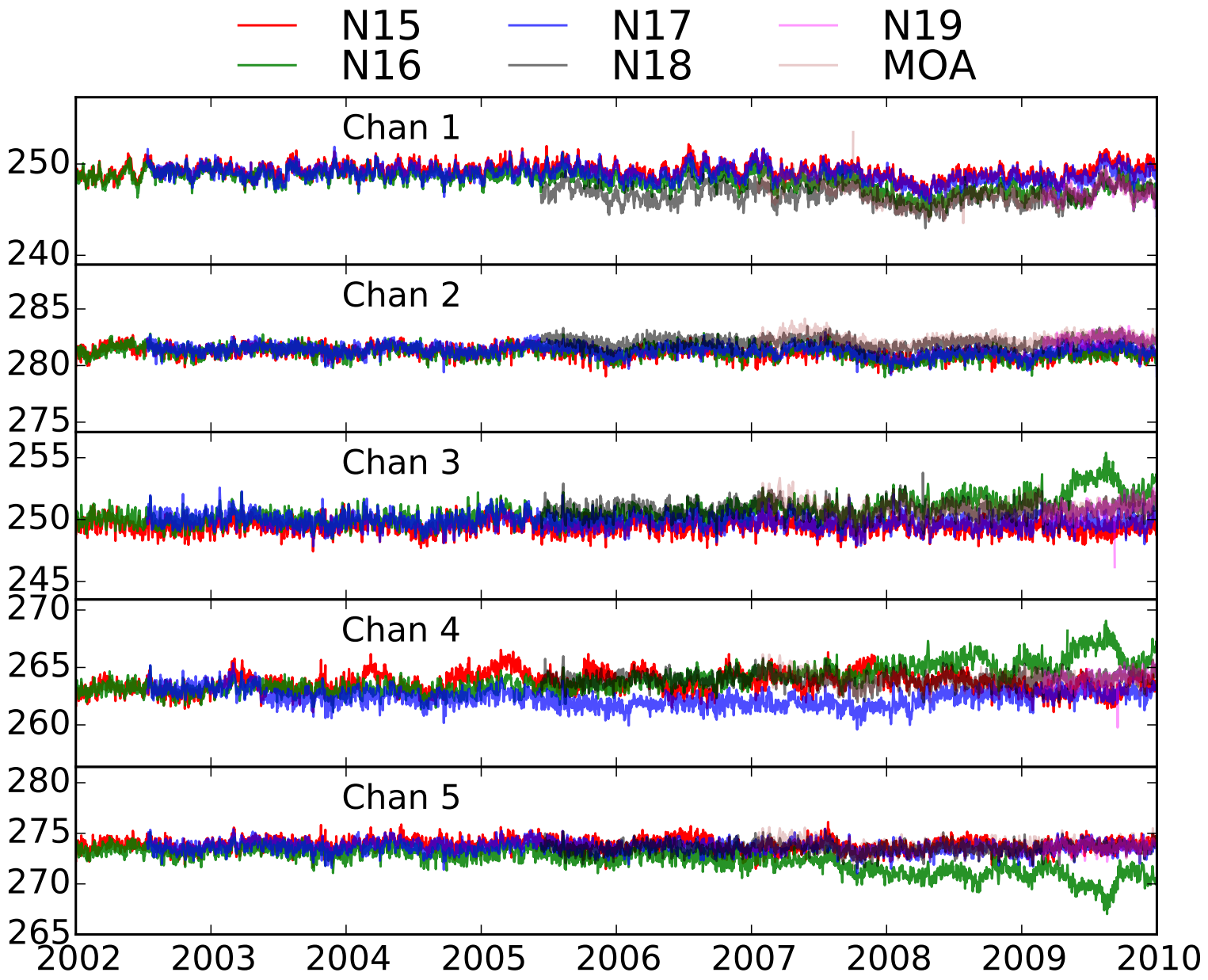
Impact of Clouds (N15 - N17)



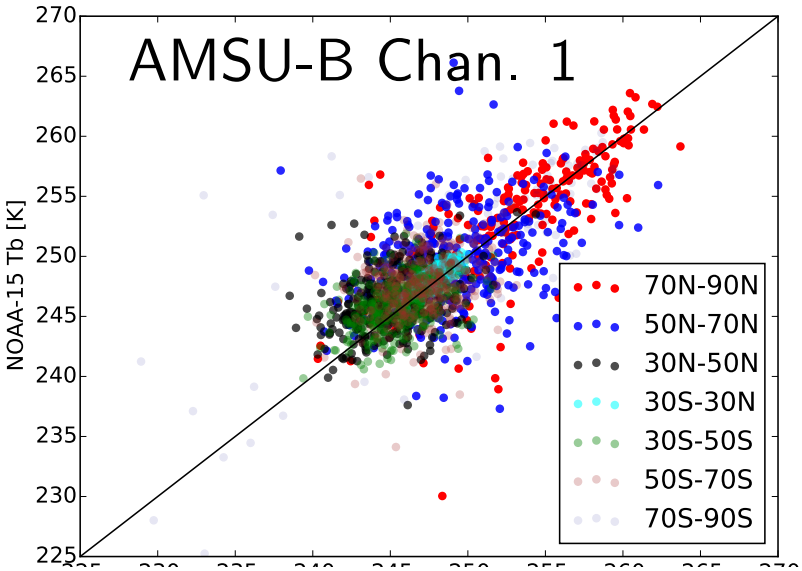
Polarization Difference (N17 vs. N18)

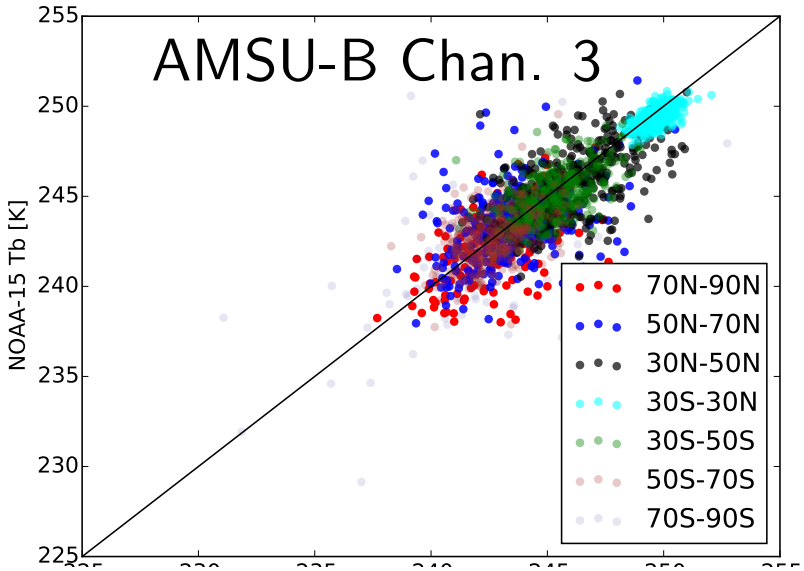


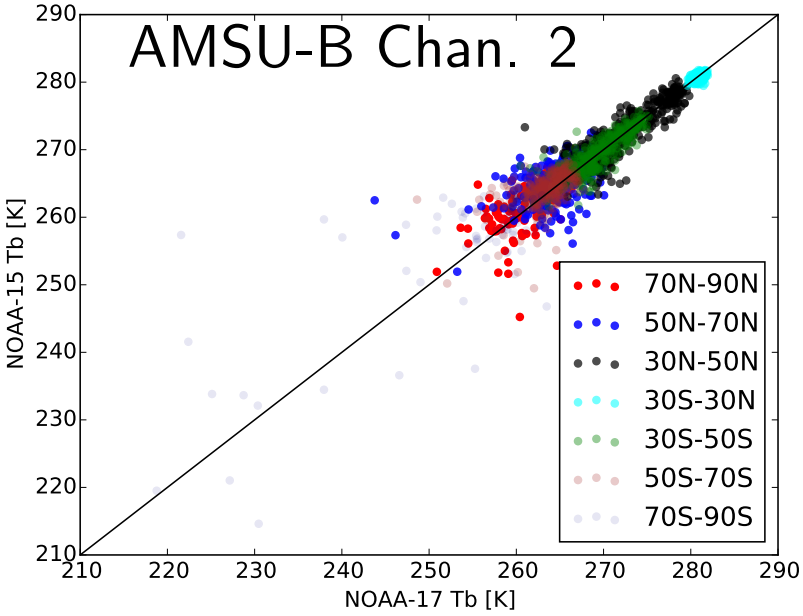
L1b Tb Averages Over Tropical Ocean

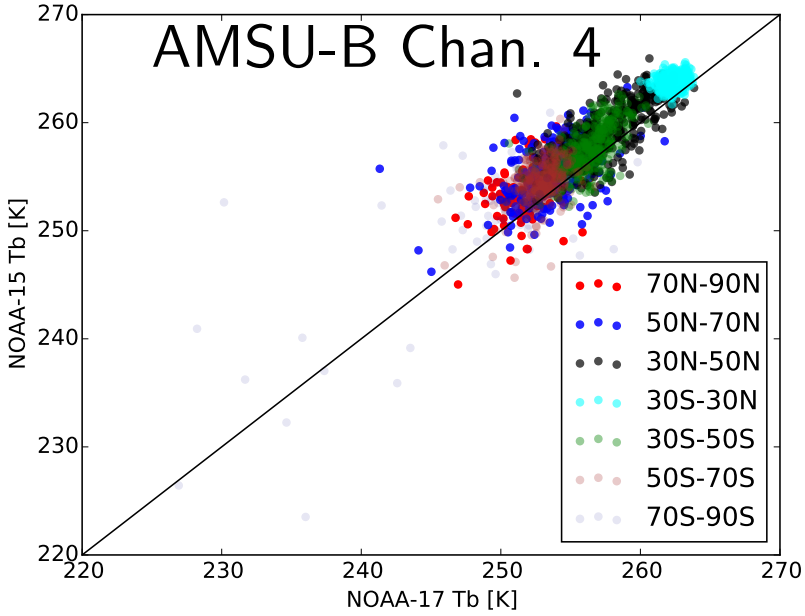


Correction Schemes

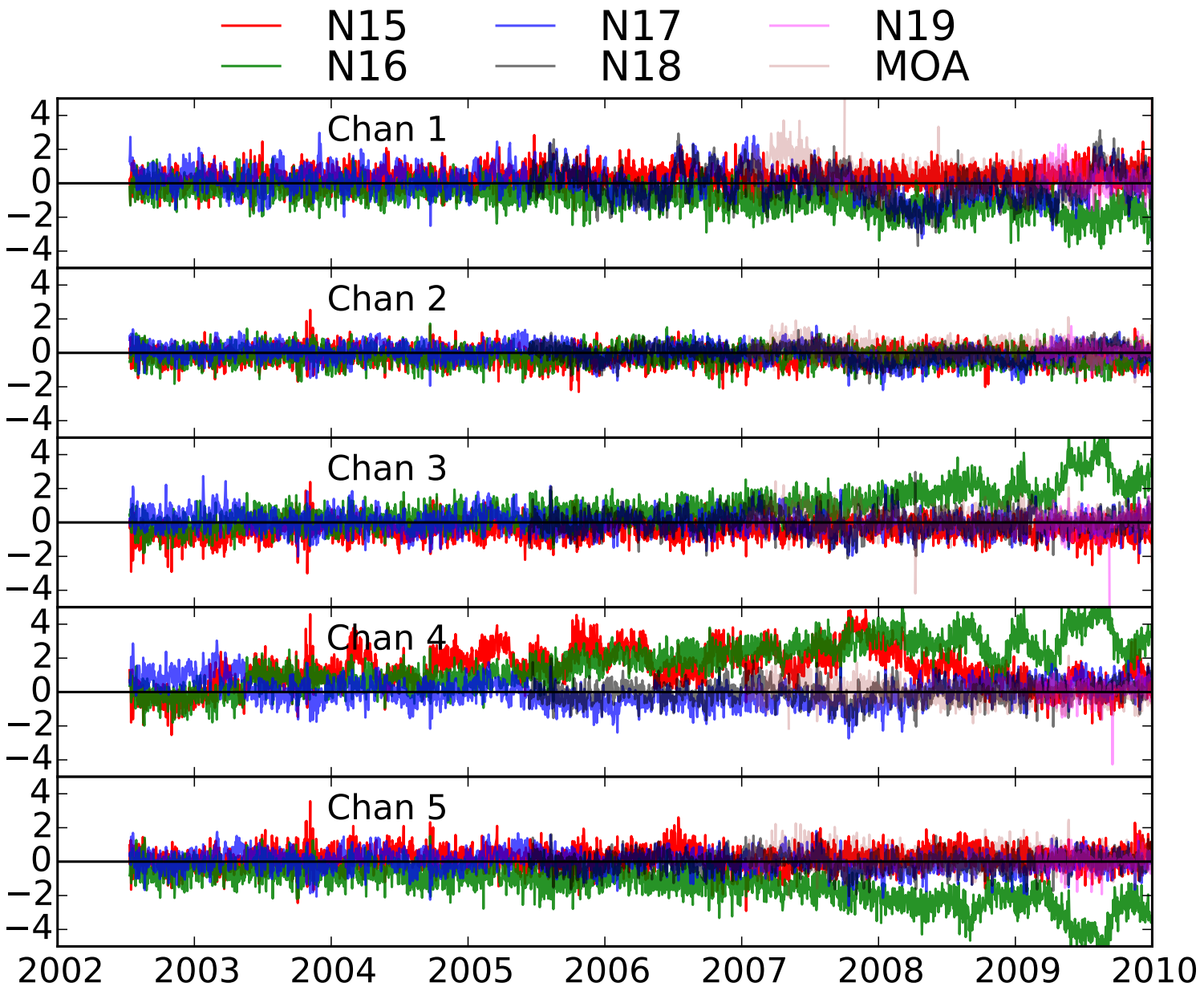




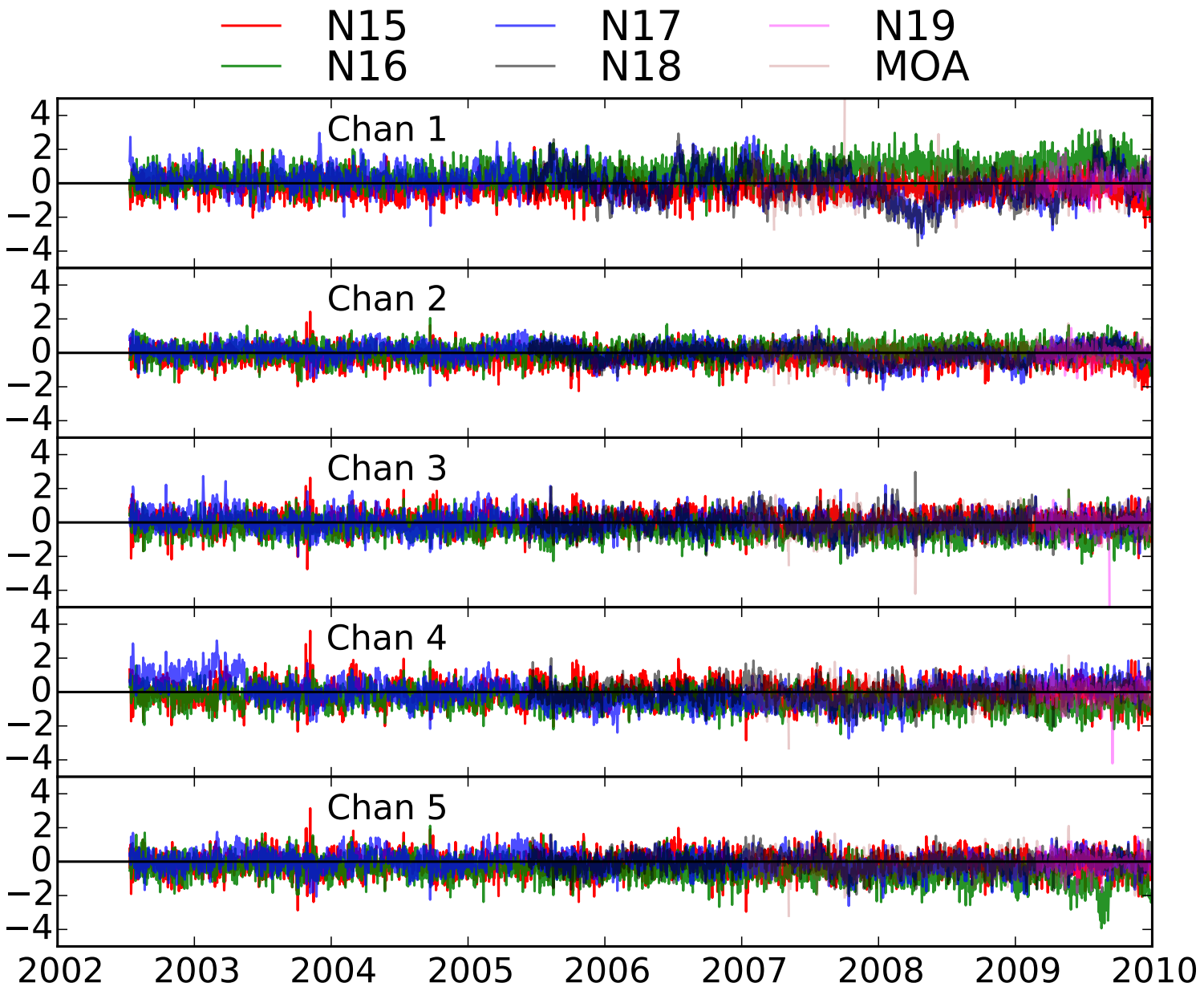




Level 1b Averages Over Tropical Oceans



FCDR Averages Over Tropical Oceans



Conclusions

- The NWP calibrated AMSU-B measurements can be significantly improved by recalibrarion using RFI and APC information
- The geolocation error in AMSU-B and MHS instruments is not significant compared to the geolocation error in AMSU-A
- Tropical ocean and night-time polar regions can be used as radiometrically stable targets for intercalibration of micrwove humidity sounders
- Several channels of AMSU-B on NOAA-15 and NOAA-16 satellites show a large calibration drift
- Frequency and polarization differences do not allow to inter-calibrate AMSU-B and MHS

Thank you for your attention!